

Pensieve header: Sep 29: The Catalan numbers.

**Topics** (in no particular order). Whatever you may suggest; whatever comes to my mind; ~~the Fibonacci numbers~~; **the Catalan numbers**; ~~the Jones polynomial~~; a more efficient Jones algorithm; a riddle on spheres; Khovanov homology;  $\Gamma$ -calculus; the Hopf fibration; Hilbert's 13th problem; non-commutative Gaussian elimination; free Lie algebras; the Baker-Campbell-Hausdorff formula; wacky numbers; an order 4 torus; the Schwarz Lantern; knot colourings; the Temperley-Lieb pairing; the dodecahedral link; sound experiments; barycentric subdivisions; a Peano curve; braid closures and Vogel's algorithm; the insolubility of the quintic; phase portraits; the Mandelbrot set; shadows of the Cantor Aerogel; quilt plots; some image transformations; De Bruijn graphs; the Riemann series theorem; finite type invariants and the Willerton fish.

---

## The Catalan Numbers

**Project Idea.** Make an easily extendible,  $n$ -dependent "Catalan objects poster", as explained on the blackboard.

---

## Further topics

Class photo; EIWL 5-8, a riddle on spheres, Etienne's project.